

CLAIMS

I claim:

1. Method for producing laser-induced holograms inside transparent materials by using laser-induced damages comprising:

- calculation of the interference pattern, corresponding to given object;**
- transformation of the said interference pattern into arrangement of points so that laser-induced damages created at these points are able to reconstruct high quality holographic image;**
- generating and focusing laser radiation at the points of the transparent material corresponding to the points of the said arrangement so that the marks generated as a result of the interaction of laser radiation with the material are created.**

2. The method in accordance with claim 1 including creation of an arrangement of laser-induced damages, which reproduce given interference pattern by producing laser-induced damages at the predetermined points inside transparent material, which does not have special light-sensitive characteristics.

3. The method in accordance with claim 1 including creation of an arrangement of laser-induced damages, which being illuminated, reconstruct holographic image of given object.

4. The method in accordance with claim 1 including the transformation of interference pattern into damage arrangement by the division of the transparent material area into several regions and production of laser-induced damages inside these regions so that this damages approximate the interference pattern.

5. The method in accordance with claim 1 including creation of an arrangement of laser-induced damages wherein the coordinates of points, at which the breakdowns should be produced, are determined as a result of n independent trials with possible outcomes described by probability density function, which is proportional to the intensity of corresponding interference pattern.

6. The method in accordance with claim 1 including combined production of laser-induced image and laser-induced hologram that gives a chance to realize new visual effects.

7. The method in accordance with claim 6 including production of interference pattern at least on one side of laser-induced image.

8. The method in accordance with claim 6 including production of iridescent background by creating an arrangement of the damages corresponding to the diffraction grating (or iridescent hologram).

9. Method for production of small laser-induced damages by controlling and transforming wavelength of laser radiation generating breakdowns at the predetermined points of transparent materials, comprising:

- **determination of functional dependence of damage sizes from sizes of focal point for given transparent material;**
- **determination of focal point sizes corresponding to damage sizes;**
- **transformation of laser radiation so that it has the wavelength corresponding demanded damage sizes;**
- **generating laser radiation of determined wavelength and focusing the transformed laser radiation at the predetermined points of transparent material to generate laser-induced breakdowns.**

10. Laser-computer system for production of laser-induced holography comprising:

- **computer system for calculation of interference pattern, corresponding given object;**
- **computer system for transformation of the said interference pattern into arrangement of points, so that laser-induced damages, created at these points, are able to reconstruct high quality holographic image without internal split of transparent material;**
- **laser system for generating laser radiation to creation of laser-induced damages of demanded sizes;**
- **optical and moving systems for focusing laser radiation at the predetermined points of the transparent material to produce the breakdowns at these points.**

11. The system in accordance with claim 10 including a laser, which generates radiation with the wave length corresponding to the needed sizes of laser-induced damages.

12. The system in accordance with claim 11 including a laser system, which produces laser-induced damages inside transparent material by generating at least the second (or higher) harmonic of the basic radiation.